PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.

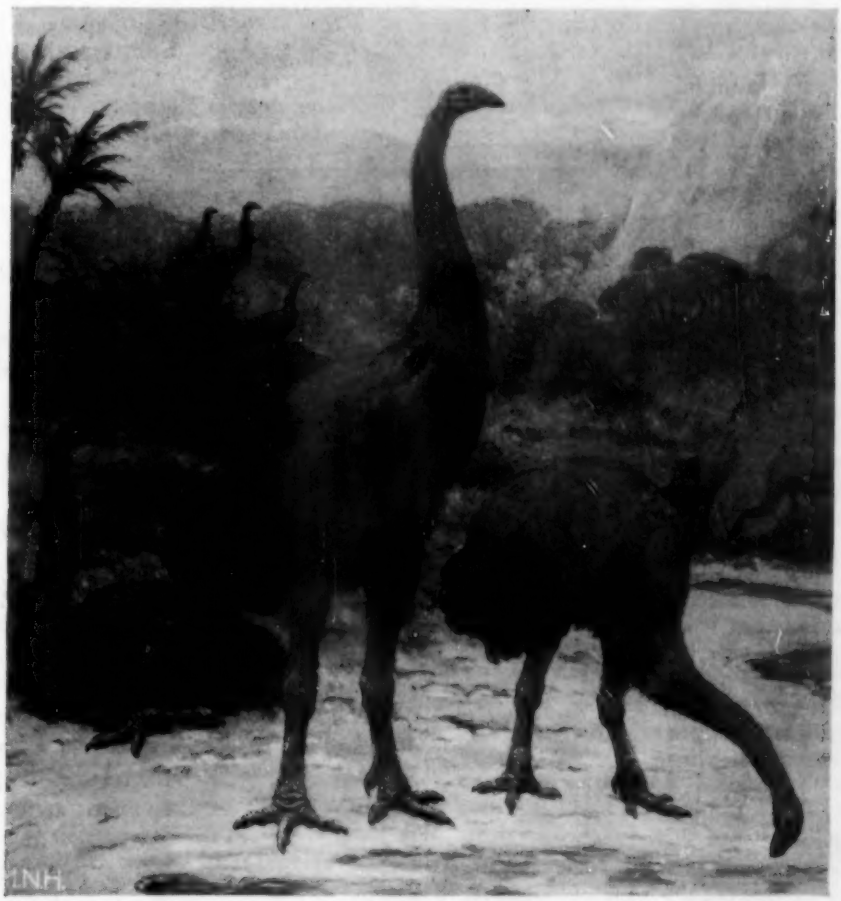
OCT 6 1928

SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

$5 a year 15c a copy Sept. 29, 1928



EXTINCT, BUT LIVING IN TRADITION

Maoris Still Tell of the Moa Hunts of Their Ancestors

(*See page* 188)

Vol. XIV *No. 390*

Rhodesian Man Stooped

Anthropology

Rhodesian Man, that strange prehistoric human being with a man's brain but almost a gorilla's eyebrows, walked with a permanent stoop, keeping his eyes almost perpetually fixed on the ground. This picture of an unaspiring great-great-uncle of our race has been drawn by a well-known English scientist, W. P. Pycraft, as the result of new studies on the skeletal remains found seven years ago in Africa.

The base of the skull, Mr. Pycraft found, has a remarkably large area for the attachment of massive neck muscles. He believes those were needed to support the head in its downward-looking position, and especially to pull it up quickly in order to gaze around when a suspicious sound hinted the presence of an enemy.

Further evidence of an habitual stooping posture was found in the size of the spinal cord canal in the base of the vertebral column. This is much smaller than in modern man, intermediate between the human and gorilline conditions. The constantly stooping gorilla has weak rear limb muscles, and only a small nerve trunk to supply them; man has powerful muscles to hold him erect and a correspondingly large nerve group to run them. The argument therefore is that Rhodesian Man stooped; not as much as a gorilla, perhaps, but a great deal more than a modern man.

The most striking evidence, however, was found in the hip-joint itself. The socket in the pelvis, or hip-girdle, of the fragmentary skeleton is set in such a position that bent and shambling-gaited legs were as natural to Rhodesian Man as they are inconvenient and tiring to us.

In recognition of the bent posture of this early side-branch of the human race, Mr. Pycraft has proposed a new generic name, *Scyphanthropus*, which means "stooping man."

Science News-Letter, September 29, 1928

The cover illustration of this week's SCIENCE NEWS-LETTER is taken from a painting of the giant prehistoric Moas of New Zealand. The generic name of these huge creatures, *Dinornis*, means "Terrible Bird"; and the Moa must have indeed looked terrible to the ancestors of the Maoris who found it living in the islands when they first arrived there. The painting is by Charles R. Knight, and was presented to the Field Museum of Natural History by Ernest R. Graham.

Greeks Buttoned on Armor

Archæology

The old Greeks and Romans used buttons instead of buckles on their armor to fasten the shoulder straps to the cuirass, claims Kate McK. Elderkin of Princeton, N. J., in a report to the Archæological Institute of America.

Cords or leather thongs, wrapped around the buttons and tied, were often substituted for buttonholes. The buttons themselves had a central hole and were held in place by knotted string or cord. This was the case both on armor and on articles of clothing on which buttons appear.

Figures on vases, statuettes and friezes are cited by Miss Elderkin as examples of the ancient Greek and Roman use of buttons in this way.

No Greek word for button is known, the word for pin or fastening occurring instead. Miss Elderkin argues that this does not prove that the Greeks had no buttons, and describes many small, decorated and perforated disks which have been found, and which, from their close resemblance to the modern variety and also to the fastenings shown on paintings and statues of ancient Greece, must have been buttons.

Miss Elderkin cites particularly a dancing girl in a bronze group from Herculaneum, now in the Naples Museum. She is shown fastening the right button of her chiton or tunic. She holds the button in her left hand and with her right draws the fold of material over a shoulder from behind, preparatory to fastening it over the button. If it were a pin, she would hold the back and front folds of the chiton in one hand while she inserted the pin with the other.

Science News-Letter, September 29, 1928

In This Issue—

Birds of the past, p. 189—Warmer Arctic, p. 191—Color changes and atoms, p. 191—Young Indians, p. 192—Russian health problem, p. 193—How to see around corners, p. 193—100 percenters, p. 195—Snapshots, p. 196—Earth safe, p. 197—No more fading, p. 197—Orange isn't an orange, p. 199—Books, p. 199—Might have been a poet, p. 200—Early electrochemistry, p. 201.

SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science. *Medical Progress* is merged into the SCIENCE NEWS-LETTER.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

Advertising rates furnished on application.

Copyright, 1928, by Science Service, Inc. Republication of any portion of the SCIENCE NEWS-LETTER is strictly prohibited since it is distributed for personal, school, club or library use only. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service, details and samples of which will be gladly sent on request.

INTERPRETING week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable topography and the most convenient arrangement.

The *clippability*, *indexing*, and *automatic dating* of each article are unique features.

This is a *separable* magazine. Each original article can be clipped or torn out without losing or damaging another important article on the other side. These original articles are backed by reprinted quotations or excerpts, short one-sentence items, advertisements, and other material not likely to be clipped and preserved.

Each article is automatically *indexed* by the key word printed in italics just below the heading, or at the end of the article when the article has no heading. Articles can thus be filed easily into any system of classification, whether it be Library of Congress, Dewey, or one of the reader's own devising.

Each article is automatically *dated* by its last line.

All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

Birds That Never Came Back

Paleontology

The annual southward flight of all but the hardiest of birds at the close of summer may be taken as a kind of epitome of a greater drama that is written across the geological records in the rocks of America. For what happens on a small scale every year apparently occurred on a grand scale a long time ago, when the Arctic came south not for a few months' visit but for a stay of nearly half a million years—the long glacial winter which men of science call the pleistocene.

Nearly four million years of summer had preceded this vast southward march of seemingly endless snowstorms that piled into mile-thick ice. Four million years of mild climate, of paradise for birds, of no need for long migrations, during which they could deploy and evolve into feathered forms which the world had never seen before and which it will never see again.

Many of them were doubtless beautiful; the larger of them, whose fossils have naturally survived more frequently than those of the delicate-boned little species, were strange and terrible.

These bigger birds had their day, but when the long winter of the ice age loomed they could not migrate, and so they ceased to be. Only their bones now remain to puzzle scientists and make museum visitors gasp in wonder.

One of the most ancient of these fantastic avian nightmares has received the name of *Hesperornis*, which Englishes into "bird of the west."

Hesperornis swam and dived in the shallow seas that covered large areas of the interior of North America back in the Cretaceous period, from 55,000,000 to 120,000,000 years ago. He had wings but he could not fly. He had legs and feet but he could not walk. He had teeth like a fish and he was almost as much at home in the water as a porpoise.

Yet *Hesperornis* was a true bird and not merely an experimental attempt of nature to fasten wings on a reptile, such as is represented by the well-known *Archæopteryx* of the Old World with its lizard's tail and teeth.

This curious creature stands very close to the foot of the historical ladder of bird life in North America. It is represented today by several practically complete skeletons in which five species can be recognized.

AN IDYLL of the Upper Jurassic: The Courtship of the Archæornis

"These birds," says Dr. Alexander Wetmore, assistant secretary of the Smithsonian Institution, "seem to have fed on fish which they captured by diving. They were so adapted for aquatic life that they had entirely lost the power of flight. The legs projected at right angles from the body so that it is doubtful if the bird could stand on them at all. Hesperornis, it appears, presented the most highly specialized development for aquatic life of any bird yet known. It traveled through the water by propulsion of its tremendously powerful feet, which are of such form and have such size in relation to the remainder of the skeleton that it is probable that at need the bird could develop the speed and agility in turning around of the modern shark or porpoise."

One other toothed bird existed in North America in the Cretaceous period, but compared to the nightmare-like *Hesperornis* it presents quite a commonplace picture. This was Ichthyornis, a genus in which seven species have been recognized from the fossil remains.

Ichthyornis was only about as large as a common pigeon. "The neck," says Dr. Wetmore, "was long and the head was large and strong, with long jaws implanted with many small, sharply pointed, recurved teeth set in sockets. The wings were large, long and strong, the breast-bone heavily keeled and the legs and feet comparatively weak. *Ichthyornis* was developed pre-eminently for flying. It flew by feathers and not by means of a skin membrane, as do bats."

An odd feature of Ichthyornis was the fact that the vertebræ have the form found in fish and some amphibians, and which is duplicated in no other birds, living or dead.

Throughout the Cretaceous period the birds were clinging close to their reptilian ancestry but with the dawn of the next geological period, the Tertiary, there is a sudden change. The teeth have disappeared. The fossil forms found are more like modern types, so that many of them have been placed in existing families of the feathered creatures of earth.

Approximately 25 species have been described from the eocene, the first time division of the Tertiary period, but some, Dr. Wetmore says, have been named from very inadequate material and may not be birds at all.

Most notable of the new birds found in North America at this time was the *Diatryma Steini*. A nearly complete skeleton of this bird has been recovered in Wyoming. It was nearly seven feet high. It has strong legs, a heavy head, a great arched bill and very small wings. It probably was a flightless land creature. It has been placed near the rails and cranes, although the relationship is not very close.

At about the same time—possibly a little later—there existed in eastern Patagonia another huge winged creature, *Phororhacos*. It was larger than an ostrich. It had a remarkably heavy skull, as large as the skull of a horse, to which the legs, huge as they were, bore no adequate proportion. *Phororhacos* has been described as like "a great, thick-legged ostrich with the head of a still greater hawk," and very likely he would not have been a pleasant fellow to encounter unarmed.

It was during the latter part of the Tertiary period, the miocene and pliocene eras, that the modern forms had their origin. Then the great tree-top choirs came into being. This, in fact, may have been the golden age of the feathered creatures.

Says Dr. Wetmore: "It seems probable that (*Turn to next page*)

Birds That Never Came Back—*Continued*

the bird life of the miocene and pliocene was even more varied and wonderful than that of today and that a larger number of species may have existed. Climatic conditions in that time had not developed such sharply marked zones as in the recent period. Though the temperature was not oppressively warm it was moderate and fairly uniform at points much farther north than under modern conditions.

"Forms that we now consider as sub-tropical then ranged north into northern Nebraska, and probably farther. The present number of species in tropical and sub-tropical sections of America is much greater than in the temperate zone. Ecuador has approximately the same area as California. The known bird life of Ecuador, at present numbers 1,508 forms, more than the whole of North America north of Mexico, while that of California at the end of 1924 included only 594 species and subspecies.

"By analogy you may support a rich and highly varied bird life for the miocene and pliocene periods in North America, a fauna that since has been in part exterminated and in part restricted to more southland latitudes. Further research may be expected to increase considerably the list of fossil forms from this section of geologic time."

Then came the ice. The great glaciers crawled down over blossoming sub-tropical swamps, bringing with them the cold and the storms and creating a vast desolation. They drove the birds before them through the long, dreary centuries. Many species became extinct. In pleistocene beds, Dr. Wetmore says, there are remains of 50 species which have no living representatives although they are closely approximated by some existing forms, and 105 species of birds which survived and are alive today.

The ice retreated and the birds came back. Once again the dewy tree-tops were musical with their voices but they did not have long, geologically speaking, to enjoy themselves. Their greatest enemy was at hand. Already strange ogre-like beasts were crouching on a river bank in Java or even gnawing rhinoceros bones in front of caves in central Germany. The retreat of the ice also marked the emergence of the greatest enemy bird life has ever known, Man.

Man, it is true, had no wings to follow the birds into the tree-tops and into the blue skies. But he invented deady flying things to pursue them—stones from slings, arrows from bows, and finally bullets from guns.

Following the increase of man over the earth, says Dr. Wetmore, "there has been a steady reduction and extermination among birds, a process that will continue in spite of protective regulation until most of the peculiar forms have disappeared and only the more adaptable ones remain."

Few chapters of the book of the rocks are more fragmentary or more difficult to decipher than that dealing with the birds. Concerning the mammals, the amphibians and the reptiles long, detailed and picturesque chapters are presented in the hieroglyphics of fossils. There are approximately 25,000 living bird families in the world. There are only about 700 fossils that have been found to tell the story of the birds of the past, and many of these are so fragmentary that it is stretching a point to consider them as representatives of birds at all.

Of all those that have lived in North America throughout time only 259 left any remains, so far as is known.

There must be a peculiar combination of circumstances in order to produce large beds of bird fossils. Such conditions doubtless obtained when the deposits in Fossil or Christmas Lake in Oregon were laid down. Here hundreds of bones of birds have been discovered.

In the pleistocene this probably was a small, alkaline lake, similar to some which still exist in that area. Now in the past few years hundreds of thousands of water fowls have been destroyed by a peculiar malady known as "duck-sickness" which has been especially prevalent in the deltas of streams flowing into Great Salt Lake, but is known also in the neighborhood of smaller alkaline lakes.

The water birds are affected by excessive concentrations of alkali in the waters in which they feed, and become paralyzed and die unless they can have immediate access to fresh water. The number of individuals killed in this way in the last twenty years, Dr. Wetmore says, runs into the millions. Christmas Lake probably killed them in the same way during pleistocene time.

Great numbers of fossil bird bones have also been recovered from the famous Rancho La Brea in the suburbs of Los Angeles. Here outpourings of asphalt from the depths of the earth have been exposed in such a way that animals were trapped and held in the sticky embrace of the substance until they died. Then the bones were preserved for centuries, many of them in perfect condition, in a bed of tar.

The Rancho La Brea deposits were laid down during the first interglacial period, it is believed, and they contain the remains of the largest creature that ever flew with wings, the giant *Teratornis Merriami*, exceeding in wing spread the modern condors. It is represented by an almost complete specimen.

Another species very abundant in these deposits is a bird supposed at one time to be a peacock, but now admitted to be a species of turkey.

Two-fifths of the forms found in the Rancho La Brea deposits are extinct, Dr. Wetmore says. Nearly 60 species have been identified and as yet the smaller forms, the perching birds in particular, have not been studied carefully.

Of the Christmas Lake deposits only one is held to be generally distinct from modern birds. Most of the genera might be expected in this area today, but there is one flamingo which exists now only in warm climates in the Northern Hemisphere. This, Dr. Wetmore says, does not necessarily indicate that Oregon was warmer than it is now when the deposits were laid down because a somewhat similar species ranges and nests through Patagonia, where the summer weather often is cold and inclement.

From New Jersey have come the remains of a genus known as *Paleotringa* which bears some slight resemblance to our modern snipes. Another type has been placed among the rails and still another with the ducks, geese and swans.

The skeletal remains of these species are very slight, however, and Dr. Wetmore questions the wisdom of grouping them with any modern families of birds which are familiar to Americans of the present day.

Science News-Letter, September 29, 1928

The number of Americans in Mexico has decreased from about 75,000 in 1911 to about 20,000 at present.

Arctic Getting Warmer

Oceanography

That the Arctic climate is getting warmer, at least temporarily, is indicated by studies made by the U. S. Coast Guard's expedition to the waters between Labrador and Greenland, and which has just returned after an absence of over two months. One of the purposes was to measure ocean temperatures in this area, and by this means they found that a surface layer of water 100 meters in thickness, covering an ocean area of 100,000 square miles, was five degrees warmer than normally. "Such an additional heat reservoir of tremendous proportions is bound to have far-reaching climatic effects", pointed out Commander Edward H. Smith, who commanded the expedition.

Other important conclusions reached as the result of the expedition were as follows:

The bottom water in the trough between Greenland and Labrador has a temperature of 37 degrees Fahrenheit and a saltiness of 3.49 per cent. "The observations showed", said Commander Smith, "that this water was not produced on the surface or by melting ice, as suggested in theories of Nansen and Pettersson, but indications point to a slow bottom creep from the Antarctic as the source of such waters, even off Greenland."

The coastal shelves of Greenland are much narrower than shown on present day maps, while the Labrador shelf is wider.

Three headlands were sighted by the Marion north of 60 degrees latitude, which indicate that the coast of Baffin Land, as shown on maps, is in some places as much as 20 miles in error.

The Arctic waters were extremely open this summer. About a thousands bergs in Disko Bay near the glacier front and 200 bergs stranded on the Labrador Coast near Cape Harrison, constituted practically the only ice present. The Arctic pack itself shrank to 20 miles off Cape Dier, Baffin Land.

In telling of the experiences of the expedition Commander Smith related the excitement they had in a severe gale. Another exciting experience was when the polar bear cub which they captured, and which has now been sent to the Washington zoo, escaped from his hold and tried to fight his way to freedom. The chief casualty, however, was the back of Commander Smith's coat, which the bear clawed. But the members of the crew were not entirely without recreation, for they had dances with Eskimo maidens and at Godhavn played a soccer game with an Eskimo team. The score was 28-0, in favor of the Greenlanders!

Science News-Letter, September 29, 1928

Light Change Gives New Atomic View

Physics

A very recent discovery by a Hindu scientist, Professor C. V. Raman, that intense light of a single color is partly changed to other colors when it shines on various transparent substances "opens up a wholly new field in the study of molecular structure." This statement was made recently by Prof. R. W. Wood, of the Johns Hopkins University, in announcing that he had completely verified Professor Raman's discovery in the private laboratory of Alfred L. Loomis, at Tuxedo Park, N. Y.

According to Prof. Wood, who has just completed an investigation of the subject with improved apparatus and a more powerful spectroscope than the one employed by Raman, the effect occurs when monochromatic light, which is light of a single color, and, unlike white light, is entirely of a single wave length, shines on transparent substances such as quartz, chloroform or water. The light that is scattered from the material is mostly of the same color, or wave length, as that of the light illuminating it. The spectroscope, the instrument that analyzes light, shows, however, that part of the light is changed to wave length a little longer or a little shorter than the source. On the spectrum photographs the result is a heavy line attended on either side by narrower and fainter lines. The fainter groups of lines on one side are the same as those on the other, except that they are reversed, as if reflected in a mirror, the center line being the mirror. Professor Raman found only a single and very faint line on the high frequency side of the exciting line, but Professor Wood has found groups of lines on this side almost as strong as the groups on the other in the case of carbon tetrachloride and chloroform.

The importance of the discovery comes from the fact that the difference between the frequencies of the light given off, and those of the light which shines on the substance is precisely the same as the frequencies of the absorbtion bands of the same substance for infra-red light—light which is vibrating too slowly to be seen or even to be recorded on the photographic plate without great difficulty. By means of the Raman effect, the physicist can now study these bands of absorbtion indirectly.

Prof. Wood also pointed out that the effect was one of the most convincing proofs of the quantum theory of light, which supposes that light consists of separate pulses, or "quanta" rather than waves, as was formerly supposed. Only by the quantum theory, he thinks, can the effect be explained.

Most of his research was done with crystalline quartz, or such liquids as chloroform and carbon tetrachloride, illuminated with a mercury vapor arc lamp. He is now planning to repeat the work with a spectroscope of 40 feet focus, which will give even more convincing results than those he has now obtained.

Science News-Letter, September 29, 1928

Whale Mistaken for Ship

Archeology

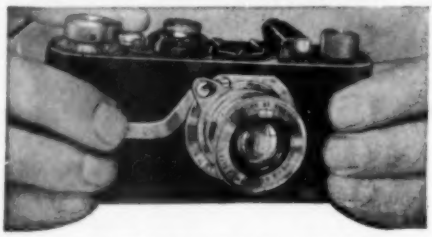
The enormous skeleton of a 5,000-year-old Greenland whale has been found at Kistinge, near Halmstad, Sweden, by workmen digging a ditch near the seashore. A monstrous jawbone, measuring about 13 feet in length, has already been unearthed. On account of its size, it was first taken by the workmen to be a part of the hull of an ancient vessel.

The bone has been examined by paleontologists, who estimate the whale to have lived at the end of the ice age, about 5,000 years ago.

Science News-Letter, September 29, 1928

Leica Negatives enlarge easily to 12 x 18 inches

Leica



"THE UNIVERSAL CAMERA"

Photography is an aid in all scientific endeavor

The Leica is the highest expression of correct scientific principles in this field

A Universal Projector for all film strips.

A Compact, Accurate Enlarger.

Compact enough to fit the vest pocket, the Leica combines all necessary features for field or laboratory work. Negatives made with the Leica are suitable for enlarging, for making projection-film slides and contact prints.

Technical and Scientific Notes as well as Lectures, supported with Leica pictures, gain in authenticity, are more impressive and serve as permanent records.

The Leica serves the Biologist, Geologist, Anatomist, Microscopist, Engineer, Explorer or any other Scientist with equal dependability.

WRITE FOR COMPLETE AND INFORMATIVE PAMPHLET NO. 1127 (NL)

E. LEITZ, INC.

60 East Tenth Street, NEW YORK, N. Y.

Agents for Pacific Coast States:
SPINDLER & SAUPPE

86 Third Street
San Francisco, Calif.

811 West Seventh Street
Los Angeles, Calif.

GOLD FISH: **Imported Japanese, Chinese and American.**

Artistic, durable aquariums, suitable for beautiful homes, conservatories, laboratories, etc. We make to order any size aquarium wished for. Fish foods, nets, aquatic plants, etc. Interesting circular gratis.

PIONEER AQUATIC COMPANY
Racine, Wisconsin

Chiggers do not burrow into the skin, but do their damage by injecting poisonous material into the victim.

A Chinese tax on eggs, designed to raise funds for education, was so unpopular that it was recently repealed.

Notable Books of the Year

Eight Books on Art

DECORATIVE MOTIVES OF ORIENTAL ART, by K. M. Ball. 1927. $15.

SHORT HISTORY OF ART FROM PREHISTORIC TIMES TO THE PRESENT DAY. 1926. $7.50.

FINE ARTS, by G. B. Brown. 1927. $3.00.

NEW DIMENSIONS, by P. T. Frankl. 1928. $6.00.

ELEMENTS OF ART AND DECORATION, by A. B. Morgan. 1928. $1.28.

HUNTERS AND ARTISTS, by H. Peake and H. J. Fleure. 1927. $2.00.

ART IN HOME AND CLOTHING, by M. B. Trilling and F. M. Williams. $1.96.

MODERN MOVEMENT IN ART, by R. H. Wilenski. 1927. $5.00.

Eight Books on Archaeology

OUR EARLY ANCESTORS, by M. C. Burkitt. 1927. $2.50.

LONG LANCE, by Chief Buffalo Child Long Lance. 1928. $2.50.

EAST OF THE SUN AND WEST OF THE MOON. 1928. $1.75. (A book of Scandinavian folklore.)

PREHISTORIC MAN, by Keith Henderson. 1928. $3.00.

RACE AND CIVILIZATION, by F. O. Hertz. 1928. $7.50.

FOREST FOLKLORE, mythology and romance, by A. Porteous. $4.50.

STORY OF THE AMERICAN INDIAN, by P. Radin. 1927. $5.00.

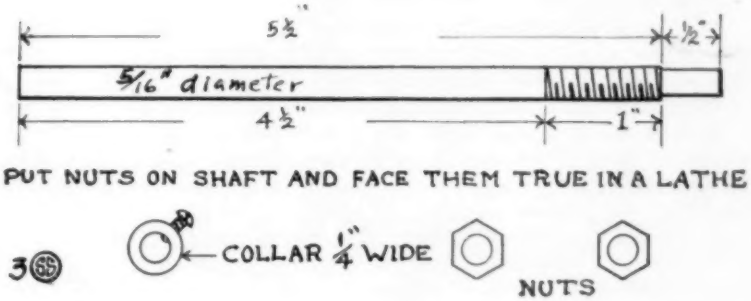
THE BRIDE OF THE SACRED WELL, and other tales of ancient Mexico. 1928. $2.00.

SCIENCE SERVICE

21st and B Streets

How to Begin Your Radiovisor

Radiovision



By C. Francis Jenkins

Just because the radiomovie receiver described in these articles is so simple, do not assume it will not work. It will. You will be able to receive very interesting pictures, small but entertaining and novel. They will be the first of a new sort of communication. They will be mysteriously picked out of invisible space.

In the radiovisor itself there are but three essential parts: A neon lamp, a scanning disc, and a motor to rotate it. A radio receiving set of good quality, capable of receiving the short wave-lengths upon which radiovision is now broadcast is also necessary. To obtain the best result a radio set with resistance coupled amplifiers is needed. But fair pictures can be had with a radio set of the ordinary sort using transformers in the amplification units. In later articles diagrams for resistance coupled sets will be given, so that those who wish to build their own may do so.

Only one part, the neon lamp, needs to be purchased. Ask for neon lamp, G-10 A. C. 110 volt. The cost will be 55 cents and it can be obtained at most electric shops.

To make the wood base mounting for the radiovisor you will need:

Piece of ¾-inch board, 8 inches wide and about 4 feet long, any kind of good wood.

Block of wood, 1½ inches wide, 3½ inches high, and 4 inches long, preferably of maple.

Four round-headed wood screws, No. 10, 1¼ inches long.

Half pound of ten-penny nails.

A shaft upon which to mount the scanning disc will also be necessary. It is recommended that this shaft, shown in the accompanying illustration, be made by a model or machine shop. Two brass bearing bushings, each about an inch long with ¼-inch holes through them, will be needed.

If you do not (*Turn to next page*)

May Check Monoxide Poisoning

Chemistry

Carbon monoxide victims in closed garages and suicides by the gas route will in future become less numerous if the resuscitation method now being tried out by Dr. Ludwig Schmidt-Kehl of the University of Würtzburg works as well on human beings as it has on cats in the laboratory. Cats so far gone with carbon monoxide asphyxiation that they would surely have died have been "brought to" by placing them in a closed chamber of pure oxygen under pressure which was alternately decreased and increased in time with their own natural breathing rate.

Carbon monoxide poisoning, Dr. Schmidt-Kehl explains, is due to the abnormal appetite of the red blood corpuscles for the unwholesome gas. They take it up 250 times as readily as they do oxygen, which is the burden they normally carry to the body cells. The latter, deprived of their ration of oxygen, die of internal suffocation.

With the red corpuscles out of commission, the situation might seem to be hopeless. But the German physiologist points out that the blood fluid itself, which ordinarily carries so little oxygen that it cuts no practical figure at all in respiration, may be induced to load up with an emergency ration by placing the asphyxiated animal or person in a closed chamber of oxygen under pressure.

If the pressure is kept at a uniform level it must be relatively high; but Dr. Schmidt-Kehl has found that much lower pressures can be used if these are alternately increased and lowered, in time with the breathing rate of the victim. This simulated breathing in a closed chamber, he has found, is much more likely to revive semi-asphyxiated animals than a uniform high pressure.

Thus far the work has been done only with a small experimental apparatus, with a chamber only large enough to contain a cat. Considerable difficulties have still to be overcome before the method can be adapted to clinical use for saving asphyxiated human beings.

Science News-Letter, September 29, 1928

Vandals who rob old tombs of China and sell the vases, bronzes, and other art objects to foreigners, have destroyed much of the valuable evidence of China's past.

There are more than 100 organs or parts of organs in the human body that have little or no function to perform, and that are useless relics of a time when they were important.

Soviet Health Problem

Sociology—Hygiene

The government ban on vice in Soviet Russia has turned the age-old problem of disease into new channels. In a book on the venereal disease situation in Russia recently published in Paris, Dr. L. Fridland, a worker in the public hospitals of Moscow, indirectly shifts the blame for the Soviet's mounting disease rate among married couples on the easy divorce conditions prevalent since the Revolution.

In 1917 only two per cent. of the cases of venereal disease seen in Moscow hospitals occurred among married people. In 1924 this rate had risen to ten per cent., Dr. Fridland declares. Out of 100 diseased individuals, only seven infected members of their own families before the war in all Russia, he stated, while in 1918 the figure mounted to 33, and in 1924 had risen to the appalling proportion of 69.

Incomplete cures and the casual marriages that have ensued since divorce laws have become less stringent are believed to be important factors in the situation, which the government is endeavoring to combat by the establishment of "prophylactorium" stations for the disinfection of people at the earliest possible stages of the disease.

Science News-Letter, September 29, 1928

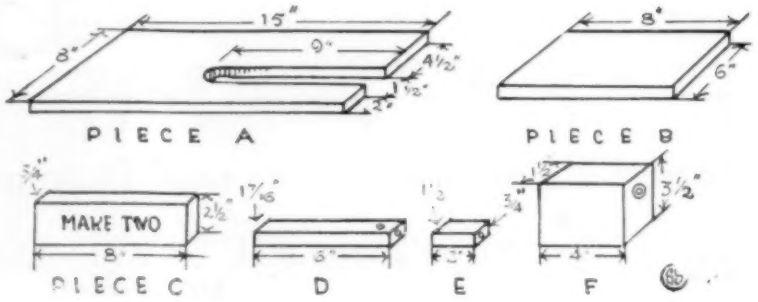
Making Your Own Radiovisor—*Continued*

wish to have the scanning disc shaft made, you can use a 5/16-inch square-headed bolt, 5 inches long with two nuts and three washers thereon between which the scanning disc is to be clamped.

You are now ready to begin the construction of the radiovisor.

The base and motor mount will first be made, using as material the piece of board and hardware heretofore listed.

The illustration shows how the pieces of the base and frame are to be constructed.



Out of the board cut piece A, a ¾-inch board 8 x 15 inches; piece B, ¾ x 6 x 8 inches; two of pieces C, ¾-inch strips 2½ x 8; one piece D, ¾ x 1 7/16 x 6 inches; and piece E, a block ¾ x 1½ x 2 inches. The block, piece E, should have a ¼-inch hole bored through it endwise; piece D should have a 5/16-inch hole bored into the end 2 inches deep, and a ⅝-inch hole through it the thin way, an inch from the end, and intersecting the 5/16-inch hole. In the large board, piece A, cut a slot 1½ inches wide and 9 inches long, 2 inches from one edge. All these pieces are illustrated. They may be made of most any kind of wood.

Take the maple block piece F, 1½ inches wide, 3½ inches high, and 4 inches long. Bore a hole through it endwise, ½ inch from top edge. Into each end of this hole push the tightly fitting brass bushings, each an inch long, the bushings having ¼-inch holes therethrough.

Science News-Letter, September 29, 1928

Our Terrestrial Dust-Speck

Astronomy

Sir J. H. Jeans in *Astronomy and Cosmogony* (Cambridge Univ. Press):

The solar system has occupied the foreground of our picture of the universe, because its members are incomparably nearer to us than other astronomical bodies. As a preliminary to filling in the rest of the picture let us imagine the various objects in the universe arranged in the order of their distances from the earth. Disregarding bodies much smaller than the earth, such as the moon, other planetary satellites and comets, we must give first place to the planets Venus and Mars, which approach to within 26 and 35 millions of miles of the earth respectively. Next in order comes Mercury with a closest approach of 47 million miles, and then the sun at about 93 million miles. Other planets follow in turn until we reach Neptune at a distance of 2,800 million miles.

After this comes a great gap—the gap which divides the solar system from the rest of the universe. The first object on the far side of the gap is the faint star Proxima Centauri, at a distance of no less than 25,000,000 million miles, or more than 8,000 times the distance of Neptune. Close upon this comes the two components of the binary star *a* Centauri at 25,300,000 million miles; these, with Proxima Centauri, form a triple system of stars which are not only near together in the sky, but are voyaging through space permanently in one another's company. After these come three faint stars, Munich 15,040, Wolf 359, and Lalande 21,185, at 36, 47 and 49 million million miles, respectively, and then Sirius, the brightest star in the sky, at 51 million million miles. Comparing these distances with the distances of the planets, we see that the nearest stars are almost exactly a million times as remote as the nearest planets.

A simple scale model may help us to visualize the vastness of the gulf which divides the planets from the stars. If we represent the earth's orbit by a circle of the size of the full stops of the type used in this book (circles of a hundredth of an inch radius) the sun becomes an entirely invisible speck of dust and the earth an ultra-microscopic particle a millionth of an inch in diameter. On this same scale the distance to the nearest star, Proxima Centauri, is about 75 yards, while that to Sirius is about 150 yards. We see vividly the isolation of the solar system in space and the immensity of the gap which separates the planets from the stars.

Before parting from this model, let us notice that the distance of one hundred million light-years to the farthest object so far discussed by astronomy is represented on the same scale by a distance of about a million miles. In this model, then, the universe is millions of miles in diameter, our sun shrinks to a speck of dust and the earth becomes less than a millionth part of a speck of dust. The inhabitants of the earth may well pause to consider the probable objective importance of this speck of dust to the scheme of the universe as a whole.

Science News-Letter, September 29, 1928

New automatic welding equipment makes it possible to manufacture metal railroad ties from scrap rails.

A volcanic eruption in the East Indies recently destroyed six villages and killed 1,000 people.

Christmas Cards

OF WOOD

Thin, silvery slices of wood, beautiful in tint and texture and daintily decorated, to convey your Christmas greetings.

Send $1.00 for sample set of five and illustrated circular.

ROMEYN B. HOUGH CO.

LOWVILLE, N. Y.

First American Colonizations Traced

Ethnology—Anthropology

Following are further reports of the meeting of the International Congress of Americanists in New York.

The real discovery of America, by primitive men who long ago crossed the icy waters of Bering Strait from Siberia, was probably not looked upon as any great adventure at all. It was almost as simple and natural a step as crossing New York harbor might be, thinks Dr. Ales Hrdlicka, anthropologist of the Smithsonian Institution.

This problem of why and how the first human beings came into America has long been a great point of controversy, but Dr. Hrdlicka stated that new evidence has accumulated in such quantities that conclusions can at last be drawn with reasonable certainty. An official report of many hundreds of skulls, a large part of which were collected personally by Dr. Hrdlicka in western and Arctic Alaska recently, will soon be issued, he stated.

"There could have been, it is now certain, no great single wave of the immigrants that became the first Americans," he said. "Instead, there was a steady and natural passing over of small groups of people, and this process lasted until recent times. Siberia is an inhospitable region, where famine and cold always threaten. Less than thirty miles across, the people who wandered or were forced by others into northeast Siberia could see signs of a more pleasing shore, freer of snow and ice. The winds from that direction were warmer. Driftwood floated from that side. There were islands which served as stepping-stones, and it was easy in suitable weather for skin boats to carry groups of these Asiatics safely across the northwest passage."

They did not necessarily stop in Alaska, or stop for a long time, Dr. Hrdlicka said, but mostly in all probability, kept on down the coast, looking for warmer and pleasanter places ahead, and so the new world was gradually populated.

"Northeasternmost parts of Asia presented the only feasible route into America for the original inhabitants in their state of culture," the anthropoligist declared. "The Asiatic ancestry of the Indian and Eskimo is demonstrated by much evidence obtained recently from old burials."

There are now more than thirteen thousand skulls in the Smithsonian collection, most of them American Study of this vast material shows that the Eskimo and Indian are related, like two fingers that extend from one hand, Dr. Hrdlicka said, and he pointed out that many typical Indian as well as Eskimo faces bear a striking resemblance to Mongoloid tribesmen of the Siberian wilderness today.

"The population of America has been established in the course of only a few thousand years, probably no more than 5,000," he concluded. "It would be a fine thing for anthropologists to find evidence of ancient man in this country, but no human bones indicating such antiquity have ever been discovered. Considering the large number of skilled observers who have been searching for clues to prehistoric life in this country it would seem likely that some ancient skeleton remains or other indisputable evidence of ancient man would have appeared by this time if there were any here.

"Another important point which now can be demonstrated through collections made during the last few years, is that the people coming over the Bering Strait and Sea were not crude barbarians, but were bringing with them a rich and highly developed culture, exceeding that of the Eskimo or Alaska Indian of the present time. This suggests strongly that the origin of the native cultures on this continent, just as the diversification of languages, may not have been wholly evolved on American soil, as was hitherto believed."

The first adventurers to set foot on South American shores followed the easiest route from North America, Dr. Marshall H. Saville, of the Heye Foundation, Museum of the American Indian, declared. This easiest route was followed in a canoe by Dr. Saville himself, and in the islands of this mangrove swamp region he found many antiquities indicating the old habitation of the islands by migrating tribes. Later, traveling groups found land routes to the southern continent, he said.

The Maya Calendar

Resemblances between the Maya calendar, an important feature of the great Maya civilization in tropical America and the calendar of the Chinese were described by Dr. Max Uhle, of the Academy of History of Ecuador. Other features of old South American cultures which Dr. Uhle believes must have been brought from Asia were also cited, supporting the theory that these similar inventions were not likely to have been evolved independently by different races. Dr. Franz Boas, of Columbia University, debated this theory, holding that the higher civilizations of Peru and Mexico might have developed quite independently of other nations.

Tell of Mexican Ruins

The actual state of preservation of prehistoric Indian cities in Mexico and lesser archæological sites, is described in a book just published by the Mexican Ministry of Education, called "Present State of the Chief Archæological Structures of Mexico," and brought to the United States by the Mexican delegation to the Congress of Americanists.

An archæological map has also been prepared by the Direction of Archæology of the Ministry of Education, under the direction of Sr. Jose Reygadas, chief of the delegation, showing the principal archæological sites of the country. There are about 1,200 such localities now registered in Mexico where there are still vestiges of the ancient civilizations sufficiently important to be preserved.

While the Mexican Direction of Archæology has done actual excavation work at but few archæological sites, work of preservation and repairing of ancient buildings has been carried on all over the country, and some of the famous ancient cities that were bearded mounds some years ago may be seen today in all the grandeur that remains; for example, Palenque, the famous ancient Maya city in Chiapas, and many ancient cities in southern Yucatan.

While tropical vegetation has worked its strong fingers into the ancient structures and has slowly torn prehistoric cities to pieces, it is not the only enemy of the archæologist, for much destruction has come from the hand of man himself. Before federal supervision of these sites was undertaken, stone conveniently cut was carried away and used in modern buildings, and many haciendas and old colonial houses have incorporated ancient carvings coming from temple facades that have since fallen to pieces. There have also been cases where so-called scientists themselves have come and carried away as souvenirs portions of buildings such as carved doorlintels and jambs and thus hurried the destruction of the remainder.

Many of the (*Turn to next page*)

International Congress of Americanists—*Continued*

federal guardians that now protect these sites from man and nature, live lonesome, difficult lives. This is especially true in the lesser-known Maya cities of Yucatan, where there is no water at the ruins and towns can be reached only through long tangled jungle trails.

In some cases the modern Indians who guard the ruins have rehabilitated some of the "chultunes" or archæological cisterns built by the ancients to solve the same water problem that confronted them.

The book published by the Ministry of Education of Mexico includes the description of about 30 of the most important sites. The large majority of the 1,200 sites are hardly known except for their existence and a few general details, but they have locked within them an enormous amount of detail as to the past.

Evidence that learned Maya astronomers who lived many centuries ago in tropical America understood astronomy sufficiently well to record not only eclipses visible in their part of the world but eclipses visible from any part of the earth, was presented by Dr. H. J. Spinden, of Buffalo. If Julius Caesar could have had Maya astronomers to advise him on his calendar problems, his Roman calendar would have been more accurate than our modern calendar, Dr. Spinden's report showed. Several scientsts reported progress in understanding the complex calendar records of this remarkable race. The greater part of the picture writing carved into ruined temples and stone monuments in the jungles of Mexico and Central America is the record of the passing of time and the dating of events. Each new symbol understood is therefore a step toward surer interpretation of the dates and facts of the ancient American civilization.

Excavation of a magnificent stucco-covered pyramid in the most ancient center of Maya civilization, Uaxactun, in Guatemala, was described by Dr. Sylvanus Morley of the Carnegie Institution of Washington. When the Carnegie expedition stripped off the rubble, there was revealed a beautiful pyramid beneath, the oldest style of Maya architecture ever discovered. The outer shell of the pyramid is dated at about 97 A. D., and the inner pyramid, which was an early place of sacrifice, probably antedates the Christian era.

Moundbuilders Mayas' Ancestors

That the Mayas, flower of ancient American civilization, had as distant ancestors a race from the Mississippi Valley, from whom the North American mound builders also sprung, is the theory of the Mexican government architect, Ignacio Marquina, reported in a volume presented to the Congress.

Striking similarities between widely distant cities of prehistoric Mexico have neveer been satisfactorily explained. Most archæologists believe that the mysterious Maya race of the tropics flashed so brilliantly that it scattered some of its customs and knowledge to the rest of Mexico. Mr. Marquina explains these resemblances by evidence that all these cities and their civilizations hark back to the same stem, the Olmeca tribe, which apparently came from the Mississippi Valley region, following the Gulf shore southward.

Mr. Marquina's theories are backed by an enormous mass of data on the architecture of ancient Mexican cities and houses, in which he shows the plans used by the old architects, and the development of architectural ideas. There were several waves of migration into Mexico, but the Olmeca were the most important, not for their numbers but for superior mentality.

The story of the important conquest of the great Maya city of Chichen-Itza by the Mexican Toltecs can be read in pictures on the walls and monuments of the city, it was shown by Dr. A. M. Tozzer, representing the American Academy of Arts and Sciences. Dr. Tozzer showed the scientists paintings in which the Maya warriors, distinguished by their leggings and deformed heads and feather-decked spears, were overcome by the Toltec conquerors with padded shields on their arms, button ornaments through their noses, and bird headdresses. The wall paintings and bas reliefs represent actual scenes of the battle and the Toltec triumph, which took place about the end of the twelfth century.

White Indians in Brazil

White Indians found in a hitherto unexplored section of northern Brazil were one of the discoveries of the seventh Hamilton Rice expedition to South America, described by the astronomer of the expedition, Weld Arnold. These white Indians had no albino traits, he said, but were very much lighter in color than other natives of the region. They had been driven to this hard jungle region where food is scarce and snakes and mosquitoes are plentiful, because four or five generations ago the Spaniards had come raiding for slaves and had forced them to seek a safe retreat. Use of aerial photography for geographical surveying was demonstrated in this exploration trip to the northern Amazon basin. Future explorations will make increasing use of aerial photographs with ground control, Mr. Arnold said.

Summer hay fever was once known as rose fever, but rose pollen seldom causes the disease.

Ducks sometimes die of lead poisoning due to their picking up stray shot while feeding.

The French police have 5,000,000 photographs in their files for use in identifying criminals.

A truck for city milk delivery which can be operated from the running board has been devised.

What's What in the World of Science

Here Are All the Newest Wonders Swiftly and Vividly Outlined

In seventy-nine fascinating sketches Dr. Slosson gives clear and brilliant glimpses into the most recent angles of science. He who runs may keep himself posted on the march of progress with this book.

AUTHENTIC—ENJOYABLE

"For a palatable combination of authentic information and real enjoyment there is nothing quite like a Slosson book."—N. Y. Herald Tribune.

BY E. E. SLOSSON

SNAPSHOTS of SCIENCE

THE CENTURY CO.
353 4th Avenue New York

Germans Overcome Radio Fading

General Science

Following are reports of the meeting of the Gesellschaft deutscher Naturforscher and Aertzte at Hamburg.

Fading, one of the chief difficulties encountered in transmitting radio messages on short waves, can now be overcome. The method is to utilize two antennas perhaps fifty to a hundred yards apart, at the receiving station, instead of the usual single antenna. This announcement was made at the meeting of the Society of German Naturalists and Physicians by Dr. H. Rukop of Cologne.

According to accepted ideas, these short radio waves, which have permitted conversations between America and Australia, gain their powers of travelling long distances as a result of the Heaviside layer. This is a region of ionized atoms, high above the earth, and which reflects radio waves striking it back to the earth. A receiver located near the transmitting station will get the direct waves, a little farther away these will be too faint to receive, but still farther the station will receive the wave that has travelled to the Heaviside layer and down again. But it is thought that irregularities in this layer may cause temporary changes in the path of the waves. Sometimes two parts of a wave may both reach the same station, but arrive at such a time that they interfere with each other. With the two antennas it would be very seldom that a weak signal reached both at the same time, and so a receiving station connected to both would always receive something.

Though short wave radio is now used throughout the world, its development is due directly to the amateur enthusiasts of the United States, declared Dr. Rukop. Ten years ago it was generally thought that these short waves were of little value, and could only be used for communication over very short distances. Then by international agreement various wavelengths were assigned for various purposes, and the amateur was given the waves shorter than 200 meters, probably because nobody else wanted them. They began to use them, and found that they could cover far greater distances than anyone had supposed, and so spurred on, have made short wave comunication between the antipodes a common occurrence. Television, which requires the use of high modulation frequencies, also needs short waves, and this also has been a recent impetus to research.

Lunar Influences

Perhaps the old ideas of the moon's effect on life are not as "loony" as it has been thought. That it influences such different creatures as human beings and worms in the south sea islands is the startling theory advanced by Prof. F. Dahns, of the University of Hamburg. He has found, he says, that when the attraction of the moon is stronger in the evening, the pulse rate is increased, as well as the body temperature. As for the worms, *Eunice viridis,* as they are known scientifically, he has found that their mating takes place when the moon pulls the earth hardest.

Immunity to tuberculosis can be conferred by the use of a salve made of dead tuberculosis germs, the scientists were told by Dr. E. Lowenstein, of Vienna. It is known as dermotubin, he said, and has been used in the last four years to immunize all Vienna school children. Three applications, a (*Turn to next page*)

No Danger of Science Blowing Up Earth

Physics—Chemistry

A billion years from now water, air, earth and iron, in the form of hydrogen, oxygen, silicon and iron and closely related elements, will continue to be the chief constituents of the earth, just as they are today. The energy used by mankind will continue to come from the sun, or perhaps from another sun that may have been formed when our present one is used up. There is no danger that scientists, in their efforts to "split the atom," may start a world-wide atom-splitting that will result in the complete annihilation of the earth in a burst of energy.

This was the reassuring message brought to the Society of Chemical Industry by Dr. Robert A. Millikan, director of the Norman Bridge Laboratory of Physics of the California Institute of Technology and winner of the Nobel Prize for physics. At the society's recent New York meeting he was awarded the Messel Medal of the society in recognition of his work.

But his address also contained a pessimistic note. Energy can be made from the gathering of atoms of hydrogen to form heavier elements, especially helium, oxygen, silicon and iron. Out in the space between the stars this is probably happening. Cannot man take the enormous quantities of hydrogen that exist as water in the oceans, and turn them into these elements? Dr. Millikan thinks that this is forever beyond the reach of mankind, for, he said, "the indications of the cosmic rays are that these atom building processes can take place only under conditions of temperature and pressure existing in interstellar space."

In suggesting this source of energy, Dr. Millikan departed from previously held ideas. With the discovery of radium by Madame Curie about thirty years ago, it was found that it and allied elements are constantly disintegrating into single elements, with the liberation of energy. Many have thought that a similar process was taking place in all the elements, though too slowly to be observed in the small quantities available for laboratory study. On the whole, however, it was thought, it might be great enough to be an important source.

Einstein's discovery that mass must disappear if energy is to appear, combined with the development by F. W. Aston, an English physicist, of the relation between the weight of the atom and the mass of the electron at its center, show that this is nit true, said Dr. Millikan. An atom with a weight less than a hundred times that of hydrogen cannot disintegrate like radium. As 99 per cent. of the earth consists of elements of lower atomic weight than 100, we do not get much energy from this source. In fact, he said, "the energy available through the disintegration of radioactive or any other atoms may perhaps be sufficient to keep the corner peanut and popcorn man going on a few corners in our larger towns for a long time to come, but that is all."

It is this fact also, he stated, that shows how un- (*Turn to next page*)

German Science Meeting—*Continued*

month apart, produced reactions in a third of the six year old youngsters, which indicates active immunity. Despite the virulence of the live germs, the salve is not harmful to those manufacturing it, he said, and it is now being made regularly by the Vienna Serological Institute.

Jekyll-and-Hyde Germs

The possibility of germs, previously harmless, rising in revolt and attacking human beings, while other pathogenic organisms abandon their life of crime and become adapted to peaceful residence in the human system, was presented by Dr. A. Gottstein, chief German health officer. Dr. Gottstein attributed the small number of epidemics during and after the World War to a tolerance to germs, developed during the milleniums of our enforced living with them. This factor, plus personal hereditary immunity, he said, explain the low ebb in the number of cases of scarlet fever and diphtheria despite wartime malnutrition.

A given strain of germs may lead a Jekyll-and-Hyde life, Prof. Emil Gottschlich of Heidelberg believes. Various epidemics may be due to periodic changes in their virility, enabling them at times to do great mischief but at other times leaving them impotent. Prof. Gottschlich also agreed with Dr. Gottstein that there is a possibility of previously harmless germs running amuck and starting an epidemic in that way.

Dr. Peter Debyo of the University of Leipzig drew a vivid picture of the crowded existence that atoms have to put up with. He asked his hearers to imagine a cube of common salt one millimeter on a side, as being enlarged a thousand and million times. This would make an immense block six hundred miles on a side—about the distance from Washington to Detroit. Yet in this vastly enlarged cubic millimeter of salt the atoms of chlorine and sodium would be only a foot apart.

Tetrapyrrol

The oxygen-carrying compound of the blood has at last been driven into its corner and compelled to confess its chemical identity by Prof. Otto Warburg of Berlin. It is an iron compound bearing the chemical label tetrapyrrol and belongs to the class of substances known to the technical world as "ferments." It is ten thousand times more sensitive to light than haemoglobin. But the light affects it beneficially, for when it is poisoned by combination with carbon monoxide, the combination is readily broken up by faint illumination, and the ferment can then resume its function of carrying oxygen.

Living matter has an atomic structure peculiar to itself, declared Dr. H. Mark of Ludwigshafen. The grouping of the atoms in protoplasm into special groups called micellae, found in living things and nowhere else, was postulated by the great botanist Naegeli during the nineteenth century. Now, said Dr. Mark, Nägeli's hypothesis has been definitely proved, thanks to new technique involving the polarization of light and its utilization in the ultramicroscope to demonstrate the structure of such micellae in rubber, cellulose, sugar, etc. Atomic models of these organic structures can now be built with as much confidence as models are constructed for non-living things such as salt or silica.

Science News-Letter, September 29, 1928

A Kansas law prohibits advertising signs within 500 feet of road intersections, turns, or railroad crossings.

Earth Safe from Explosion—*Continued*

justified are the fears of the "advocates of a return to the 'glories' of a pre-scientific age who have pictured the diabolical scientist tinkering heedlessly, like the bad small boy, with those enormous stores of atomic energy and some sad day touching off the fuse and blowing our comfortable little globe to smithereens." If man ever does learn to disintegrate atoms, and he probably will, he will have to do it by putting energy into the process.

It is the cosmic rays that he has studied in collaboration with Dr. George H. Cameron, his colleague, that indicate the formation of energy in the building up of atoms out in the space between the stars. In previous addresses, Dr. Millikan has made this suggestion, and now he believes that he knows just which atoms it is that are being made. Utilizing the discoveries of Aston and Einstein, he says, he has found that only in the formation of helium, oxygen, silicon and iron out of hydrogen could rays of such penetrating power as he has observed in the cosmic rays he produced. He has worked out also the penetrating power that the rays from the formation of each of these elements should have. In very recent experiments he has found that these rays are not all of the same exceedingly short wave-length. Nor are they uniformly spread over a range of wave-lengths, like light from a white-hot poker. Instead, there are four bands in their spectrum, corresponding to four approximate wave-lengths, or four degrees of penetrating power. The most penetrating or shortest wave-lengths are capable of going through 200 feet of water or 18 feet of lead. Other groups of the rays are of less penetrating power, but these different degrees of penetrating power, observed in the experiments, correspond very closely to those calculated for the rays from the principal elements.

"The agreement," he announced, "is better than our observational uncertainty, and leaves no doubt whatever in our minds that the observed cosmic rays are in fact the birth cries of the infant atoms of helium, oxygen and silicon. We have some little indications that we can also hear the shriller birth-squeaks of infant iron, but we are not as yet ready definitely to assert it."

Science News-Letter, September 29, 1928

Staff of Science Service—Director, Edwin E. Slosson; Managing Editor, Watson Davis; Staff Writers, Frank Thone, James Stokley, Emily C. Davis, Jane Stafford; Librarian, Minna Gill; Sales and Advertising Manager, Hallie Jenkins.

Board of Trustees of Science Service—*Honorary President*, William E. Ritter, University of California. Representing the American Association for the Advancement of Science, J. McKeen Cattell, *President*, Editor, Science, Garrison, N. Y.; D. T. MacDougal, Director, Desert Laboratory, Tucson, Ariz.; M. I. Pupin, Professor of Electromechanics, Columbia University, New York City. Representing the National Academy of Sciences, John C. Merriam, President, Carnegie Institution of Washington; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, Calif.; Dr. David White, Senior Geologist, U. S. Geological Survey. Representing National Research Council, Vernon Kellogg, *Vice-President and Chairman of Executive Committee*, Permanent Secretary, National Research Council, Washington, D. C.; C. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Harrison E. Howe, Editor of Industrial and Engineering Chemistry. Representing Journalistic Profession, John H. Finley, Associate Editor, New York Times; Mark Sullivan, Writer, Washington, D. C.; Marlen E. Pew, Editor of Editor and Publisher, New York City. Representing E. W. Scripps Estate, Harry L. Smithton, *Treasurer*, Cincinnati, Ohio; Robert P. Scripps, Scripps-Howard Newspapers, West Chester, Ohio; Thomas L. Sidlo, Cleveland, Ohio

FIRST GLANCES AT NEW BOOKS

WILLIAM BATESON, F. R. S.—Beatrice Bateson — *Cambridge Press* ($8.40). In 1920, William Bateson collected ten of his papers which were addressed to a lay public and which he described as "all more or less lawfully begotten by Mendelism out of Common Sense, *me obstetricante.*" To these ten papers Mrs. Bateson has now added ten others dealing with Mendelism, evolution and education, together with three lengthy reviews.

Biography—Genetics
Science News-Letter, September 29, 1928

FIELD BOOK OF COMMON GILLED MUSHROOMS—William S. Thomas—*Putnam's* ($3.50). The gilled mushrooms are the most common of the higher fungi, and are the ones most sought after as food, though at the same time most dreaded as possible poison. In giving concise and well-illustrated descriptions of all the commoner species, backed by a carefully worked-out key, the author has done a service both to him who would study the mushrooms and to him who would eat them. For the benefit of the latter, moreover, there are appended a number of excellent receipes.

Botany
Science News-Letter, September 29, 1928

FIELD BOOK OF NORTH AMERICAN MAMMALS—H. E. Anthony — *Putnam's* ($3.50). From the jaguar of the south to the lemming of the Arctic, from the whale of the depths to the bighorn of the mountain-tops, you can have them all in your pocket in one handy volume. There are good pictures, both plain and colored, to back up the descriptions, and little distribution maps to tell you whether you have identified your species correctly for your locality.

Zoology
Science News-Letter, September 29, 1928

COMMUNITY PROBLEMS — Arthur Evans Wood — *Century* ($3.75). Housing, health, recreation, and Americanization are important problems in every community, and the success or failure of the community to solve these problems has far-reaching results in the lives of its people. In this comprehensive volume, Prof. Wood has described methods which different types of communities have developed toward solving the problems, and has analyzed the different plans and projects in the light of practical sociological value.

Sociology
Science News-Letter, September 29, 1928

ENVIRONMENT AND RACE—Griffith Taylor—*Oxford University Press* ($6.50). This account of the migration of the races of man, their settlement and ultimate status is interesting because of the author's novel viewpoint that the present status of the races is as much, if not more, the result of environment as of any inherent qualities in the races themselves. The superiority of the so-called Nordic race is questioned and the yellow races are shown in many respects to be the equal of the whites.

The book is well illustrated and contains many tables.

Ethnography
Science News-Letter, September 29, 1928

THE STORY OF ORIENTAL PHILISOPHY—L. Adams Beck—*Cosmopolitan* ($5). One need not be a student of philosophy or of Oriental peoples to enjoy this book. Mrs. Beck (E. Barrington) tells the story in as simple a fashion as possible, considering the subject. The legends and parables of Oriental peoples, so often referred to in both Eastern and Western literature, are interesting for themselves and for the picture they give of early life in the Orient, aside from their deeper significance. The book helps in understanding these Eastern people with whom philosophy plays so much more important a role than with Westerners.

Philosophy
Science News-Letter, September 29, 1928

WHEAT FLOUR AND DIET—O. O. Swanson—*Macmillan* ($2.50). A sane discussion of the place of wheat flour in the diet concludes an interesting account of wheat flour and the modern and ancient methods of milling it. Drawings and photographs add interest to the text, which will be easily understood by lay readers.

Nutrition
Science News-Letter, September 29, 1928

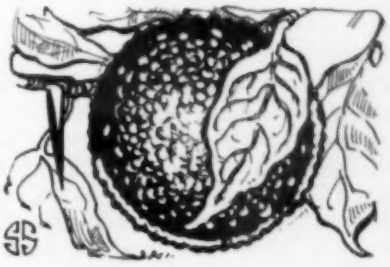
ONE HUNDRED YEARS OF AMERICAN RAILROADING—John W. Starr, Jr.—*Dodd, Mead* ($3.50). Perhaps more than any other country, the history of the United States has been linked with the history of the railroad. In this well-written and fully illustrated book, Mr. Starr tells of the development of our rail transportation, from the days of the Tom Thumb locomotive to the electric giants that now haul trains over our highest mountains.

Sociology
Science News-Letter, September 29, 1928

NATURE RAMBLINGS

By FRANK THONE

Natural History



Osage Orange

A generation or so back, when land was not so valuable as it is now and when wire fences were much more expensive, farmers used to enclose their fields in stout hedges of this thorny American tree species, which will grow as a thick bush if it is kept cropped down. The hedges were very effective to keep cattle in and small boys out, but they effectually prevented crops from growing within fifteen or twenty feet of them; so that now they are fast disappearing before the less picturesque but more economical barbed wire. In their day, however, these hedges were so universally used that midwestern farmers still refer to the Osage orange simply as "hedge", and many of them do not know any other name for it.

Permitted to grow up, the Osage orange becomes an interesting little tree, yielding crops of great round yellow fruits in the autumn. These golden globes have given the tree its name, but they are not even remotely related to real oranges. They are, indeed, quite useless and are even reputed to be poisonous. No, they are not quite useless either: they are most beautiful for boys to pick up and throw, and they make a most interesting burst when they hit something solid. Although the species is thoroughly American—its distribution centers around southern Missouri and across Oklahoma and Arkansas to Texas—its nearest relatives are to be found in the isles of the South Pacific. One of these kin-trees is the famous breadfruit.

Though its fruit is useless, with the notable exception above recorded, the tree has its use, even though its employment as a hedge is gone. Its wood is very hard and strong, and resists rotting better than any other native timber.

Science News-Letter, September 29, 1928

Sir Humphry Davy

Physics

Sir Humphry Davy, author of our Classic, was born in England in 1778, and might, according to Coleridge, have been a great poet if he had not been a great chemist. During his early school days he took no interest in science and showed no ability except for writing verses and telling stories. When he was 16 he started scientific studies in earnest and at the age of 22 published the result of his researches on nitrous oxide which made his reputation as a chemist. His discovery that the gas (laughing gas) was respirable resulted in its inhalation becoming fashionable. His chief interest, however, was electro-chemistry, which led him to the electrolytic isolation of potassium. He also gave chlorine its name and discovered the resemblance of iodine to chlorine. In 1816 he invented the miner's safety lamp. He was an extremely popular lecturer, in spite of a peculiar manner. He was president of the Royal Society for seven years, resigning because of failing health. He died in Geneva in 1829.

Science News-Letter, September 29, 1928

A Disclaimer

Editorial

Science Service has received from Hubert Sackett, president of the Bonded Tobacco Company, New York, several letters claiming for the products of his company exception from the statements made in an article in the SCIENCE NEWS-LETTER for September 8, under the head, "'Denicotined' Tobacco Fraud." This story was based on a report of experiments on "denicotinized" or "denicotined" tobacco products made by the Connecticut Experiment Station, and commented on in the *Journal of the American Medical Association.*

The object of Mr. Sackett's most vigorous protest, apparently, is the phrase "little more than a fraud", used in this story. This is a moderated paraphrase of an expression used in an editorial comment in the *Journal of the American Medical Association:* "Obviously to call such products denicotinized when they contain on an average over 72 per cent. of the amount of nicotine found in ordinary tobacco products, is practically to practice a fraud on the public."

SCIENCE SERVICE specifically disclaims that in using this phrase it had any intention of applying it to the products of any one concern. It was meant, as the context of the original story shows, to apply to any company which by its labels or advertising tends to convey to the possible purchaser an impression that all, or all but an insignificant fraction, of nicotine has been removed from the products offered for sale.

The labels of the products of the Bonded Tobacco Company bear the inscription "De-Nicotined (Bulk of Nicotine Removed)". The remaining nicotine content is not stated, nor the original nicotine content in the unprocessed tobacco. Mr. Sackett states in a letter to SCIENCE SERVICE that it would be impossible to give the exact original nicotine content of all the tobaccos used by his concern, but that by the word "bulk" as employed on the labels 60 to 90 per cent. is meant. The tobacco is treated, he states, by a vacuum process, aided in a measure by super-heated steam.

The percentages of nicotine in the various products of the Bonded Tobacco Company, together with comparative figures for the strongest and mildest unprocessed tobacco products, as determined at the Connecticut Experiment Station, are as follows:

Sackett cigarettes (two brands) 1.18 and 1.15 respectively; mildest unprocessed cigarettes, 1.14; strongest unprocessed, 3.17.

Sackett cigars, 0.74; mildest unprocessed, 1.27; strongest unprocessed, 2.07.

Sackett smoking tobacco, 1.10; mildest unprocessed, 1.64; strongest unprocessed, 2.29.

"Mild" and "strong" are used here in the ordinarily accepted sense of proportion of nicotine content. The figures are all on the basis of water-free determinations. Work of other analysts, as quoted in the Connecticut Experiment Station report, has shown some unprocessed cigarettes to have a nicotine content as low as 0.43 per cent., and others to run as high as 3.34 per cent. of nicotine.

Science News-Letter, September 29, 1928

Appian Way viaducts built by the Romans in the fourth century B. C. are still in use.

A recent Turkish law provides that there may be no more than one pharmacy to each 1,000 inhabitants of a community.

E. N. da C. ANDRADE
Engines

By the author of **"The Structure of the Atom"**

Dr. Andrade, who is now Quain Professor of Physics in the University of London, has written a fascinating new book. It deals in simple fashion and a wealth of illustration, with the principles upon which the construction of every type of engine is based; it discusses locomotives and turbines, refrigerators and dynamos; it is a book for everyone who has ever wanted to ride in a locomotive or run away in the stoke-hold of a liner. *Published Sept. 27th.* $3.00.

A. V. HILL
Living Machinery

The complete Lowell lectures for 1927. Professor Hill deals especially with muscles and nerves, but in the process touches upon practically every bodily function. "He is absolute master of his subject. We recommend it unreservedly to all interested in the workings of their own bodies or in the progress of science." *Nation and Athenaeum (London). Illustrated,* $3.00.

Harcourt, Brace and Company

383 MADISON AVENUE, NEW YORK

CLASSICS OF SCIENCE: Isolation of Potassium

Chemistry

THE DECOMPOSITION OF THE FIXED ALKALIES AND ALKALINE EARTHS, *by Humphry Davy. Published by the Alembic Club, Edinburgh,* 1807-1808.

On the Methods Used for the Decomposition of the Fixed Alkalies

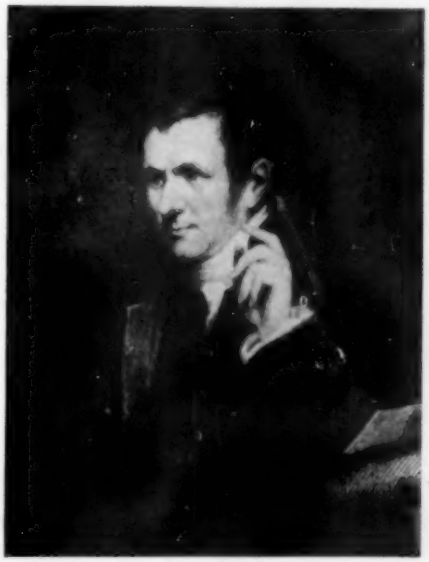
The researches I had made on the decomposition of acids, and of alkaline and earthy neutral compounds, proved that the powers of electrical decomposition were proportional to the strenth of the opposite electricities in the circuit, and to the conducing power and degree of concentration of the materials employed.

In the first attempts that I made on the decomposition of the fixed alkalies, I acted upon aqueous solutions of potash and soda, saturated at common temperatures, by the highest electrical power I could command, and which was produced by a combination of VOLTAIC batteries belonging to the Royal Institution, containing 24 plates of copper and zinc of 12 inches square, 100 plates of 6 inches, and 150 of 4 inches square, charged with solutions of alum and nitrous acid; but in these cases, though there was a high intensity of action, the water of the solutions alone was affected, and hydrogene and oxygene disengaged with the production of much heat and violent effervescence.

The presence of water appearing thus to prevent any decomposition, I used potash in igneous fusion. By means of a stream of oxygene gas from a gasometer applied to the flame of a spirit lamp, which was thrown on a platina spoon containing potash, this alkali was kept for some minutes in a strong red heat, and in a state of perfect fluidity. The spoon was preserved in communication with the positive side of the battery of the power of 100 of 6 inches, highly charged; and the connection from the negative side was made by a platina wire.

By this arrangement some brilliant phenomena were produced. The potash appeared a conductor in a high degree, and as long as the communication was preserved, a most intense light was exhibited at the negative wire, and a column of flame, which seemed to be owing to the developement of combustible matter, arose from the point of contact.

When the order was changed, so



SIR HUMPHRY DAVY

that the platina spoon was made negative, a vivid and constant light appeared at the opposite point: there was no effect of inflammation round it; but aeriform globules, which inflamed in the atmosphere, rose through the potash.

The platina, as might have been expected, was considerably acted upon; and in the cases when it had been negative, in the highest degree.

The alkali was apparently dry in this experiment; and it seemed probable that the inflammable matter arose from its decomposition. The residual potash was unaltered; it contained indeed a number of dark grey metallic particles, but these proved to be derived from the platina.

I tried several experiments on the electrization of potash rendered fluid by heat, with the hopes of being able to collect the combustible matter, but without success; and I only attained my object by employing electricity as the common agent for fusion and decomposition.

Though potash, perfectly dried by ignition, is a non-conductor, yet it is rendered a conductor by a very slight addition of moisture, which does not perceptibly destroy its aggregation; and in this state it readily fuses and decomposes by strong electrical powers.

A small piece of pure potash, which had been exposed for a few seconds to the atmosphere, so as to give conducting power to the surface, was placed upon an insulated disc of platina, connected with the negative side of the battery of the power of 250 of 6 and 4, in a state of intense activity; and a platina wire, communicating with the positive side, was brought in contact with the upper surface of the alkali. The whole apparatus was in the open atmosphere.

Under these circumstances a vivid action was soon observed to take place. The potash began to fuse at both its points of electrization. There was a violent effervescence at the upper surface; at the lower, or negative surface, there was no liberation of elastic fluid; but small globules having a high metallic lustre, and being precisely similar in visible characters to quicksilver, appeared, some of which burnt with explosion and bright flame, as soon as they were formed, and others remained, and were merely tarnished, and finally covered by a white film which formed on their surfaces.

These globules, numerous experiments soon shewed to be the substance I was in search of, and a peculiar inflammable principle the basis of potash. I found that the platina was in no way connected with the result, except as the medium for exhibiting the electrical powers of decomposition; and a substance of the same kind was produced when pieces of copper, silver, gold, plumbago, or even charcoal were employed for compleating the circuit.

The phenomenon was independent of the presence of air; I found that it took place when the alkali was in the vacuum of an exhausted receiver.

The substance was likewise produced from potash fused by means of a lamp, in glass tubes confined by mercury, and furnished with hermetically inserted platina wires by which the electrical action was transmitted. But this operation could not be carried on for any considerable time; the glass was rapidly dissolved by the action of the alkali, and this substance soon penetrated through the body of the tube.

Soda, when acted upon in the same manner as potash, exhibited an analogous result; but the decomposition demanded greater intensity of action in the batteries, or the alkali was required to be in much thinner and smaller pieces. With the battery of 100 of 6 inches in full activity I obtained good re- (*Turn to next page*)

Isolation of Potassium—*Continued*

sults from pieces of potash weighing from 40 to 70 grains, and of a thickness which made the distance of the electrified metallic surfaces nearly a quarter of an inch; but with a similar power it was impossible to produce the effects of decomposition on pieces of soda of more than 15 or 20 grains in weight, and that only when the distance between the wires was about 1-8 or 1-10 of an inch.

The substance produced from potash remained fluid at the temperature of the atmosphere at the time of its production; that from soda, which was fluid in the degree of heat of the alkali during its formation, became solid on cooling, and appeared having the lustre of silver.

When the power of 250 was used, with a very high charge for the decomposition of soda, the globules often burnt at the moment of their formation, and sometimes violently exploded and separated into smaller globules, which flew with great velocity through the air in a state of vivid combustion, producing a beautiful effect of continued jets of fire.

Theory of the Decomposition of the Fixed Alkalies; Their Composition and Production

As in all decompositions of compound substances which I had previously examined, at the same time that combustible bases were developed at the negative surface in the electrical circuit, oxygene was produced, and evolved or carried into combination at the positive surface, it was reasonable to conclude that this substance was generated in a similar manner by the electrical action upon the alkalies; and a number of experiments made above mercury, with the apparatus for excuding external air, proved that this was the case.

When solid potash, or soda in its conducting state, was included in glass tubes furnished with electrified platina wires, the new substances were generated at the negative surfaces; the gas given out at the other surface proved by the most delicate examination to be pure oxyene; and unless an excess of water was present, no gas was evolved from the negative surface.

In the synthetical experiments, a perfect coincidence likewise will be found.

I mentioned that the metallic lustre of the substance from potash immediately became destroyed in the atmosphere, and that a white crust formed upon it. This crust I soon found to be pure potash, which immediately deliquesced, and new quantities were formed, which in their turn attracted moisture from the atmosphere till the whole globule disappeared, and assumed the form of a saturated solution of potash.*

When globules were placed in appropriate tubes containing common air or oxygene gas confined by mercury, an absorption of oxygene took place; a crust of alkali instantly formed upon the globule; but from the want of moisture for its solution, the process stopped, the interior being defended from the action of the gas.

With the substance from soda, the appearances and effects were analogous.

When the substances were strongly heated, confined in given portions of oxygene, a rapid combustion with a brilliant white flame was produced, and the metallic globules were found converted into a white and solid mass, which in the case of the substance from potash was found to be potash, and in the case of that from soda, soda.

Oxygene gas was absorbed in this operation, and nothing emitted which affected the purity of the residual air.

The alkalies produced were apparently dry, or at least contained no more moisture than might well be conceived to exist in the oxygene gas absorbed; and their weights considerably exceeded those of the combustible matters consumed.

On the Properties and Nature of the Basis of Potash

After I had detected the bases of the fixed alkalies, I had considerable difficulty to preserve and confine them so as to examine their properties, and submit them to experiments; for, like the *alkahests* imagined by the alchemists, they acted more or less upon almost every body to which they were exposed.

The fluid substance amongst all those I have tried, on which I find they have least effect, is recently distilled naphtha.—In this material, when excluded from the air, they remain for many days without considerably changing, and their physical properties may be easily examined in the atmosphere when they are covered by a thin film of it.

The basis of potash at 60° FAHRENHEIT, the temperature in which I first examined it, appeared, as I have already mentioned, in small globules possessing the metallic lustre, opacity, and general appearance of mercury; so that when a globule of mercury was placed near a globule of the peculiar substance, it was not possible to detect a difference by the eye.

At 60° FAHRENHEIT it is however only imperfectly fluid, for it does not readily run into a globule when its shape is altered; at 70° it becomes more fluid; and at 100° its fluidity is perfect, so that different globules may be easily made to run into one. At 50° FAHRENHEIT it becomes a soft and malleable solid, which has the lustre of polished silver; and at about the freezing point of water it becomes harder and brittle, and when broken in fragments, exhibits a crystallized texture, which in the microscope seems composed of beautiful facets of a perfect whiteness and high metallic splendour.

To be converted into vapour, it requires a temperature approaching that of the red heat; and when the experiment is conducted under proper circumstances, it is found unaltered after distillation.

It is a perfect conductor of electricity. When a spark from the VOLTAIC battery of 100 of 6 inches is taken upon a large globule in the atmosphere, the light is green, and combustion takes place at the point of contact only. When a small globule is used, it is completely dissipated with explosion accompanied by a most vivid flame, into alkaline fumes.

It is an excellent conductor of heat.

. . . . . .

When water is made to act upon the basis of potash out of the contact of air and preserved by means of a glass tube under naphtha, the decomposition is violent; and there is much heat and noise, but no luminous appearance, and the gas evolved when examined in the mercurial or water pneumatic apparatus is found to be pure hydrogene.

When a globule of the basis of potash is placed upon ice it instantly burns with a bright flame, and a deep hole is made in the ice, which is found to contain a solution of potash.

Science News-Letter, September 29, 1928

*Water likewise is decomposed in the process. We shall hereafter see that the bases of the fixed alkalies act upon this substance with greater energy than any other known bodies. The minute theory of the oxydation of the bases of the alkalies in the free air, is this:—oxygene gas is first attracted by them, and alkali formed. This alkali speedily absorbs water. This water is again decomposed. Hence, during the conversion of a globule into alkaline solution, there is a constant rapid disengagement of small quantities of gas.